

Latest applications and developments of OMI OMAERO aerosol data

focus on the aerosol absorbing index

Deborah Stein Zweers, Pepijn Veefkind, and Gijs Tilstra
Royal Netherlands Meteorological Institute (KNMI), De Bilt NL

Aura Meeting

27 Sep 2010

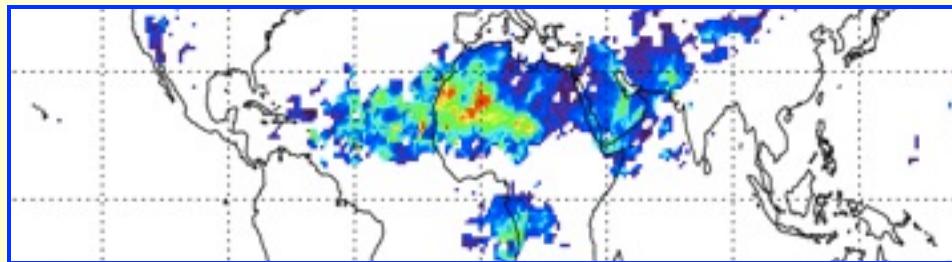
Boulder, Colorado

Overview

- Comparison of AAI for OMI and SCIAMACHY
 - Global results
 - Episodic vs. Persistent Aerosol Source Regions
 - Regional studies
 - Focus on Africa
- Case study comparison AAI: OMI and GOME-2
 - Volcanic Eruption Apr-May 2010
- Averaging Kernels: a way of AAI quantitatively
- Summary & Conclusions

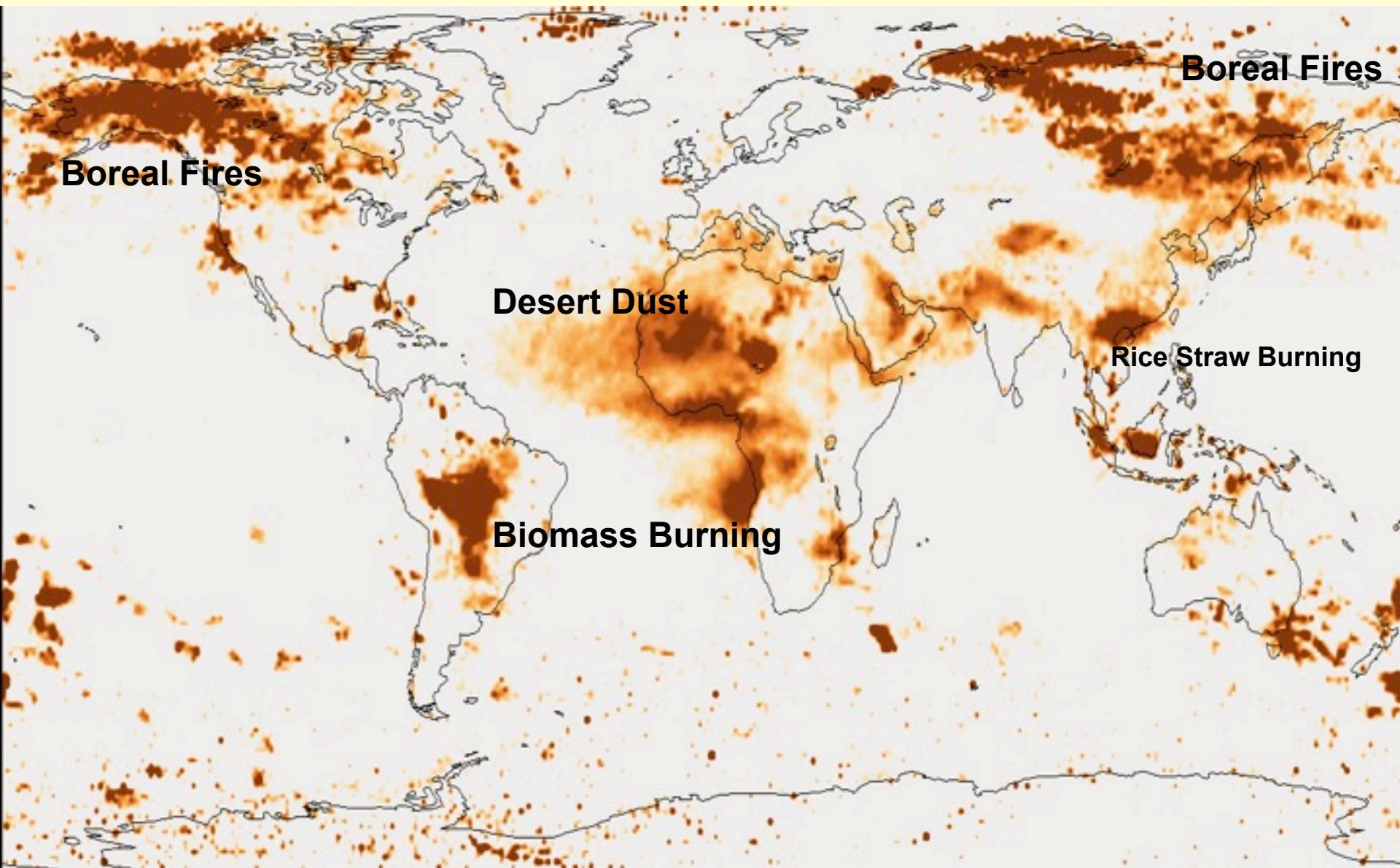
Aerosol Index: What is it?

- Definition – scene color in the UV based on a ratio of measured reflectances at a given wavelength pair compared to simulated Rayleigh-reference atmosphere
 - Results in residual value where,
 - Aerosol Index > 0 Absorbing Aerosol (Dust & Smoke)
 - Aerosol Index = 0
 - Aerosol Index < 0 Clouds or Scattering Aerosols



- TOMS heritage record going back to 1979, designed as a diagnostic for the TOMS ozone product.

Maximum AAI values from SCIAMACHY for 2002-2008



SCIA vs. OMI – AAI measurements

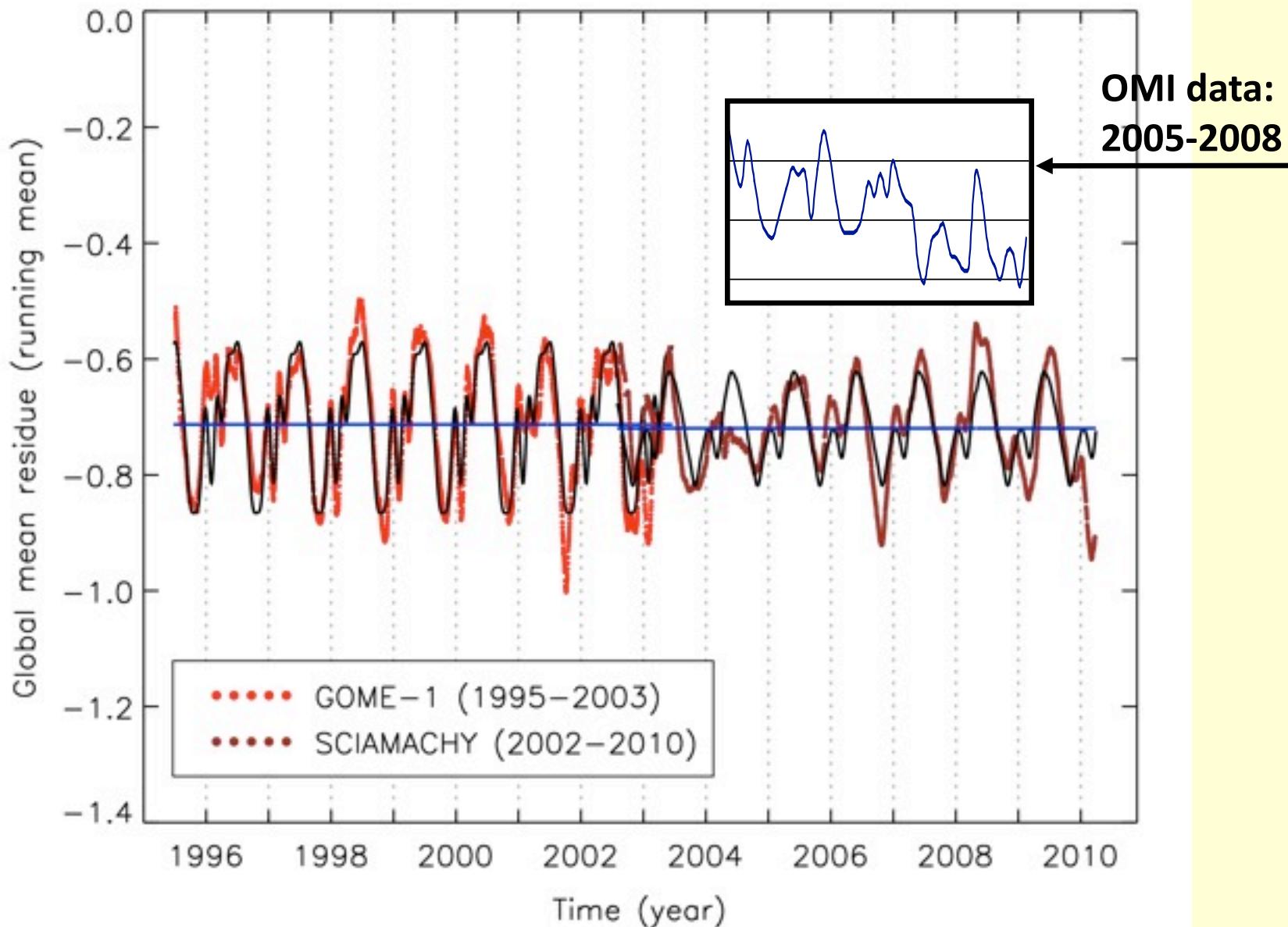
	Wavelength pair (nm)	Pixel size at nadir (km)	Days needed for global coverage	Platform / Operation Dates
SCIAMACHY	340 / 380	60 x 40	6	Envisat (2002 - present)
OMI	354 / 388	13 x 24	1	Aura (2004 - present)

- **SCIAMACHY** – SCanning Imaging Absorption spectrOMeter for Atmospheric CHartographY
- **OMI** – Ozone Monitoring Instrument

Methods for this comparison study

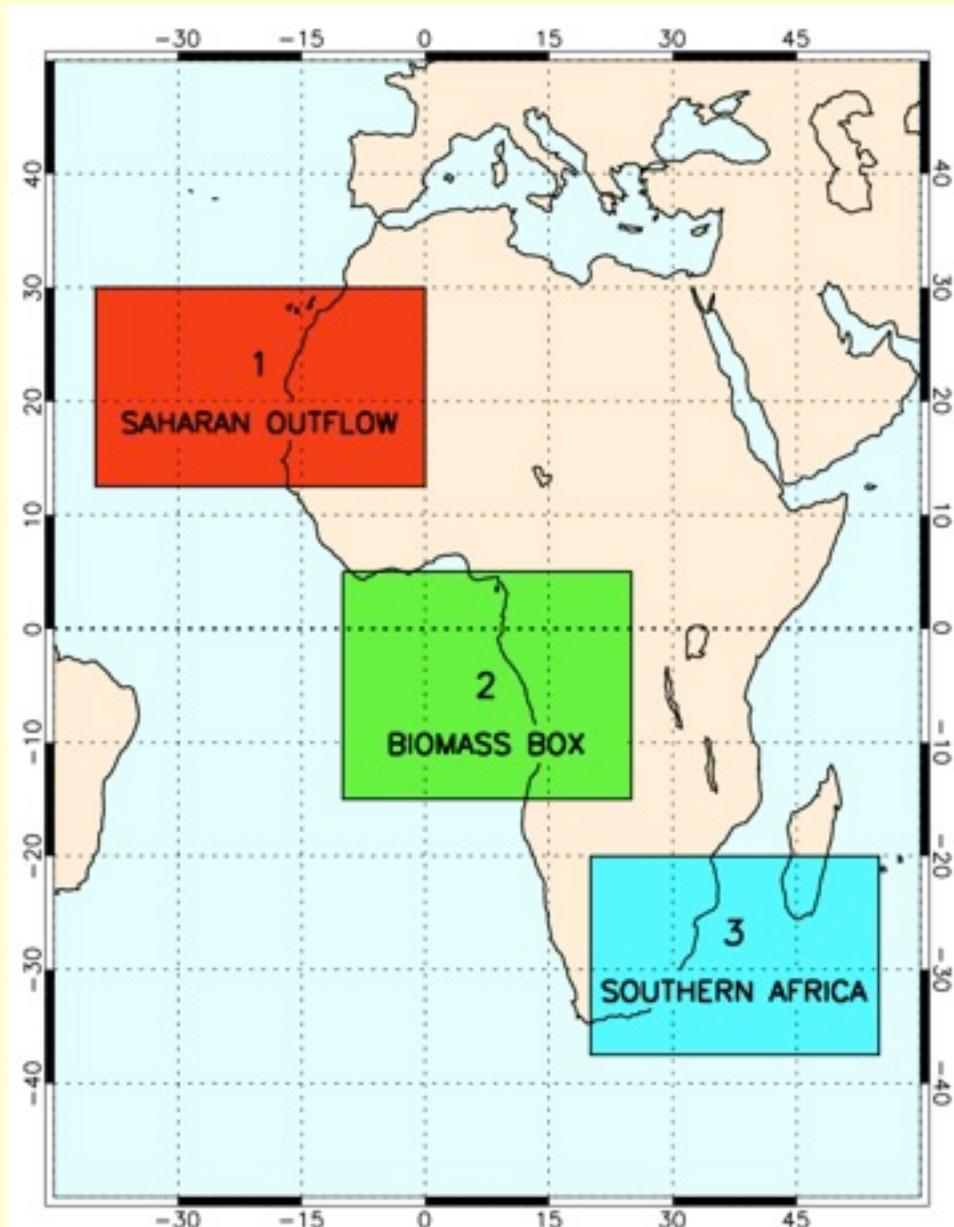
- Compare OMI AAI data from 2005-2008 to combined time series
 - Stop at 2008 (for now) to eliminate Row Anomaly
- Conditions of comparison
 - 1 x 1 degree re-gridded data
 - No solar zenith angle $> 60^\circ$
 - Sun glint removed
- Check this on global, regional scales

Global Results: Time series of mean AAI

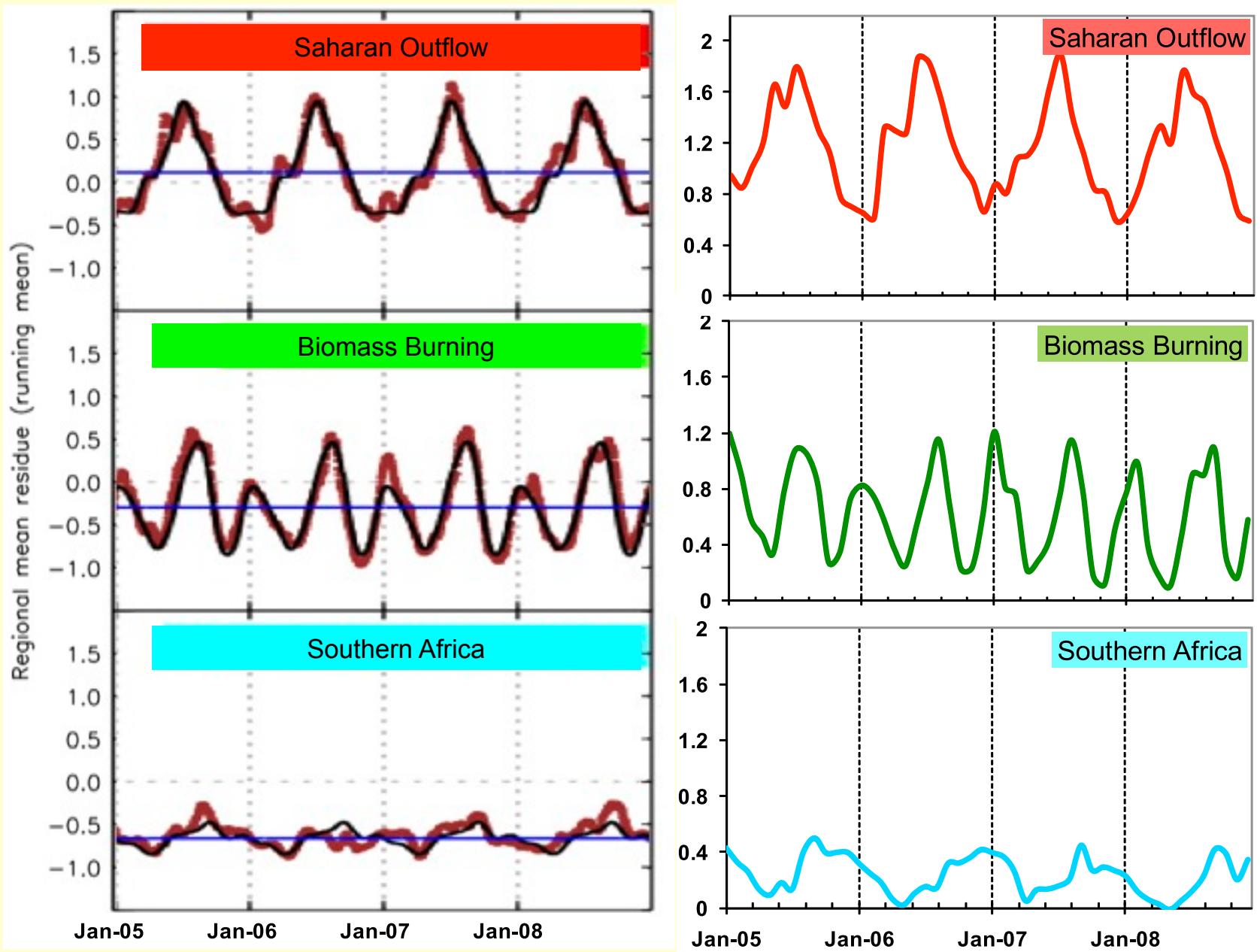


Regional Studies

- **3 African regions**
 - Rain, vegetation, and fire cycles
 - Ideal for monitoring both desert dust and smoke
- **Saharan outflow** (Region 1):
 - Primarily Desert Dust
- **Biomass burning** (Region 2):
 - Intense biomass burning and mixed source outflow
- **Southern Africa** (Region 3):
 - Seasonal biomass burning and some desert dust

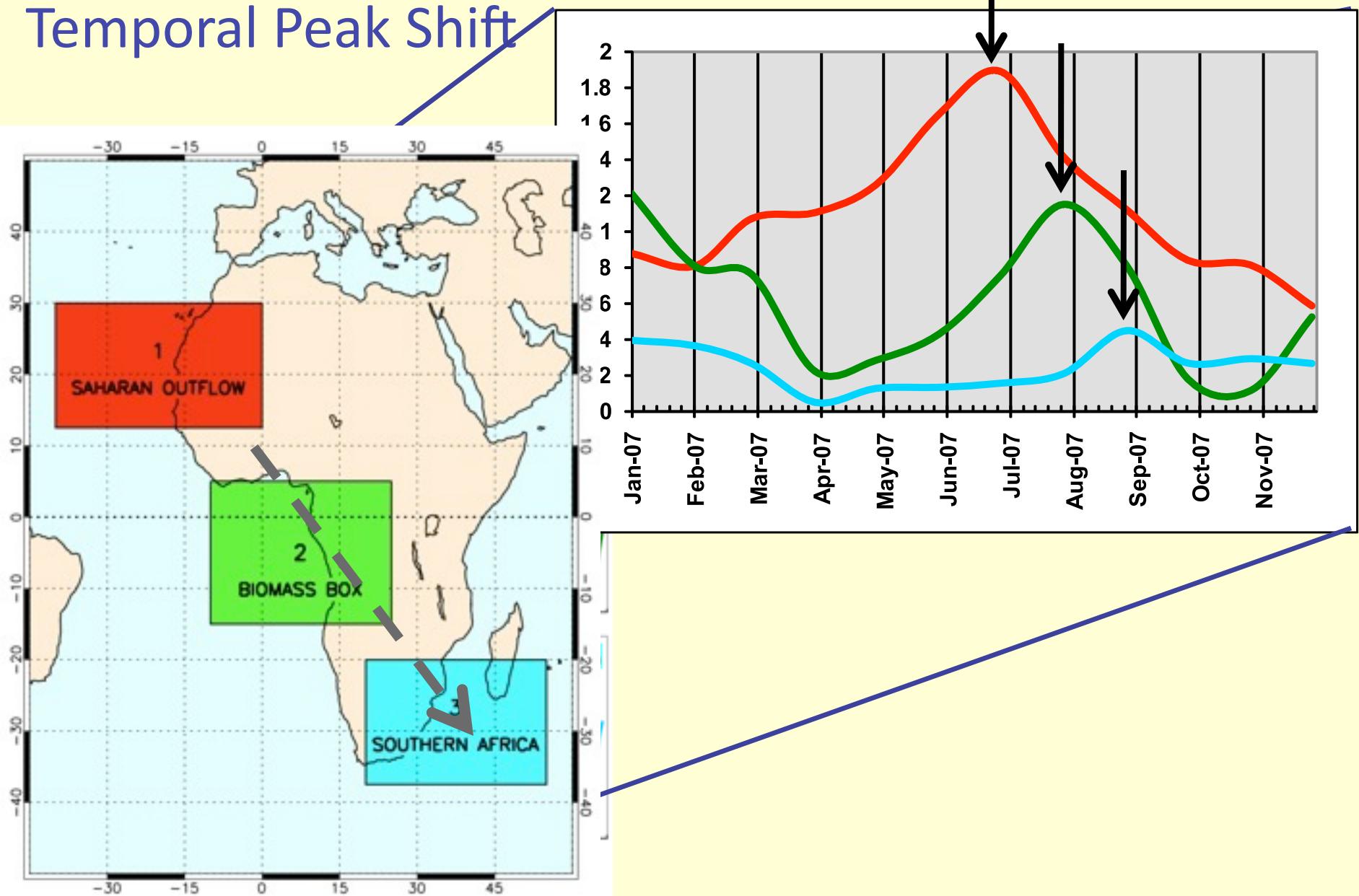


OMI Regional Data: 2005 - 2008

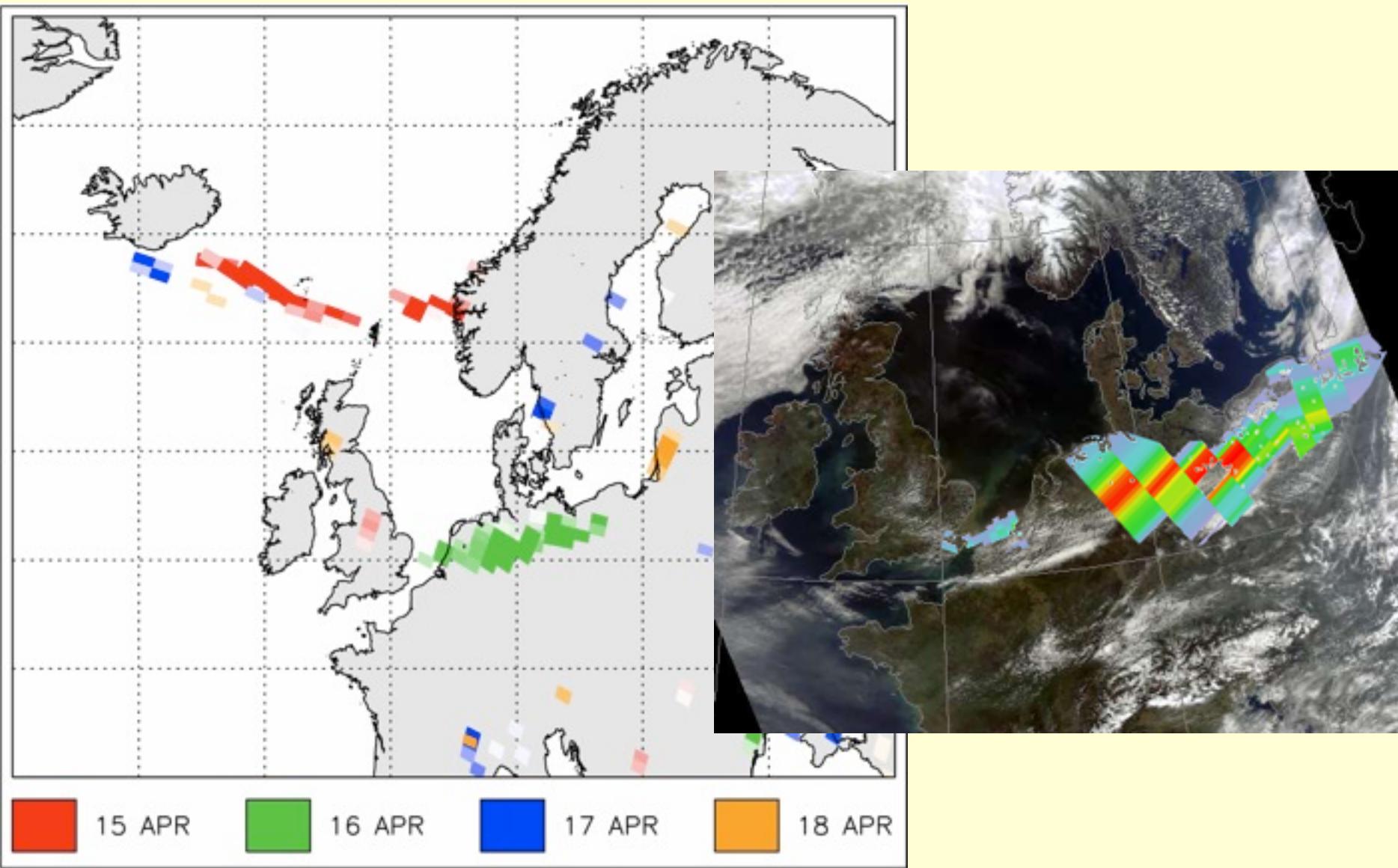


Zoom-in: African Seasonal Cycle

Temporal Peak Shift

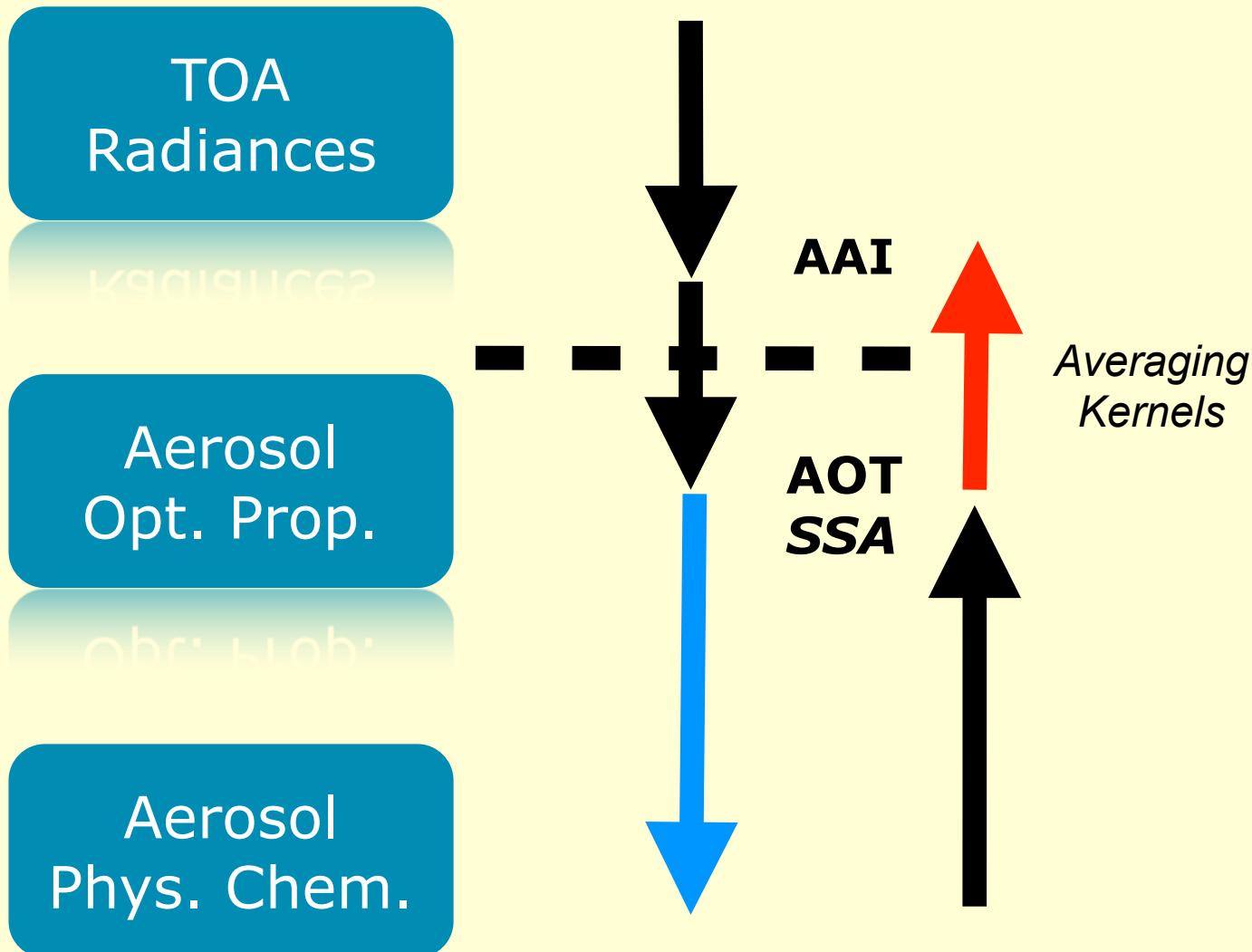


Icelandic Volcanic Ash Plume 2010



GOME-2 AAI Color coded by day

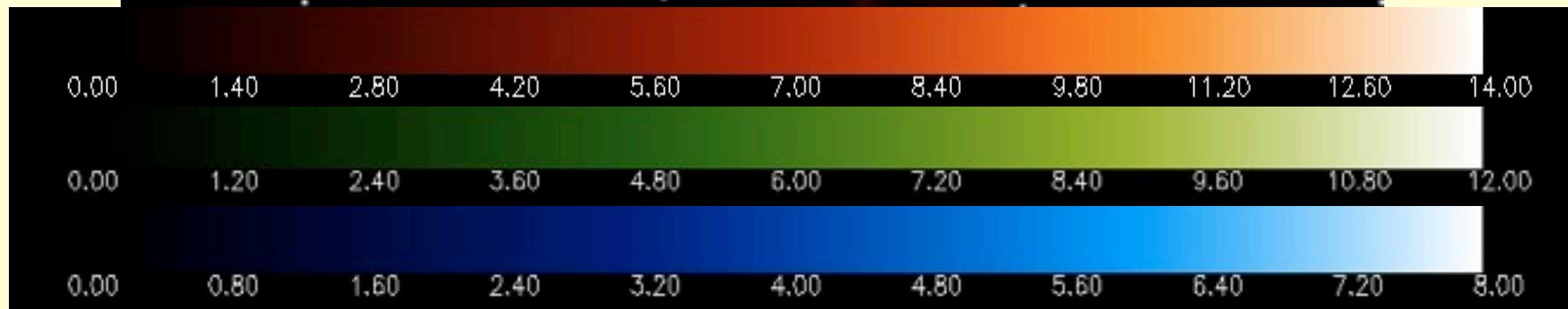
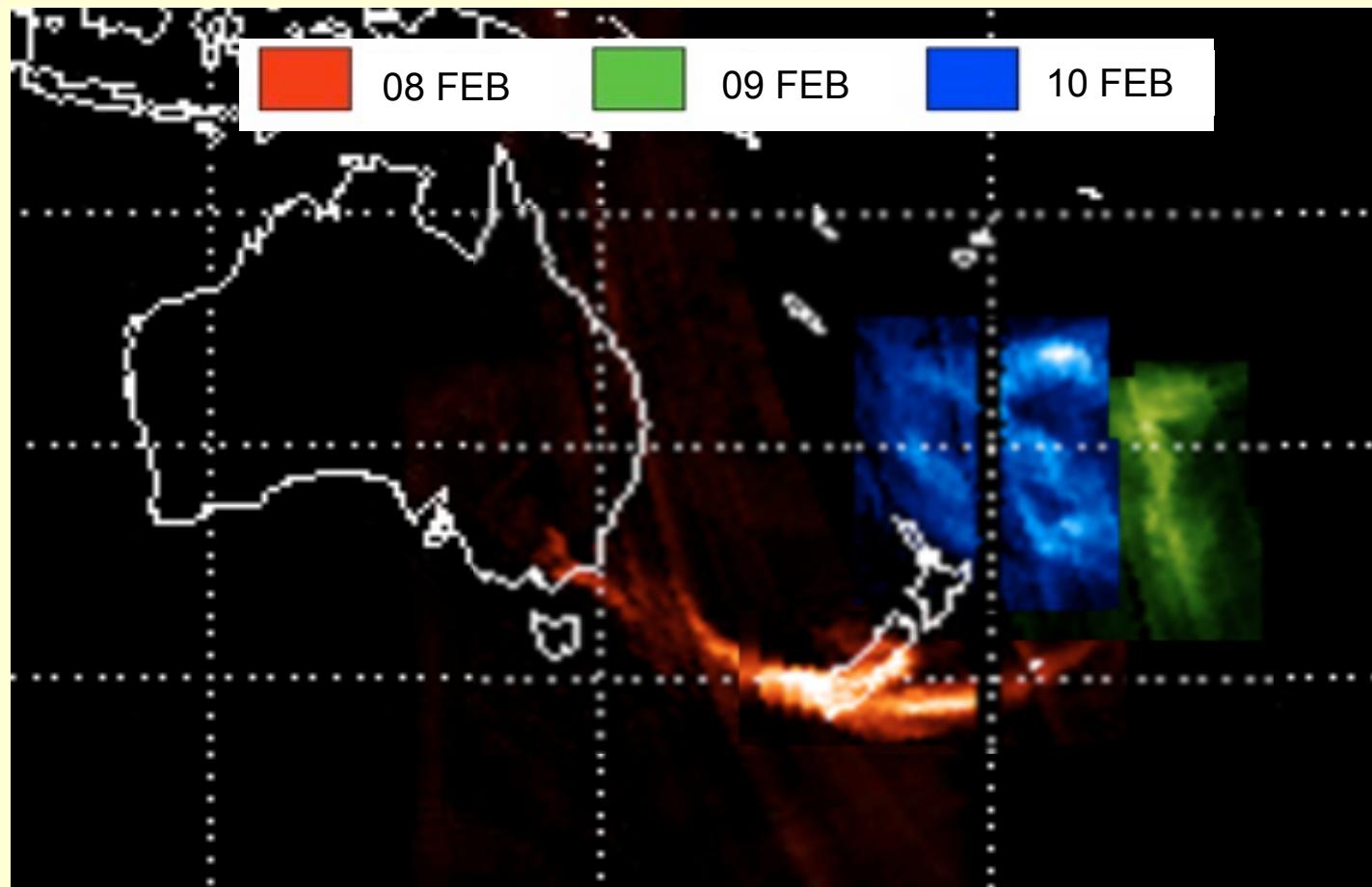
Satellite Model



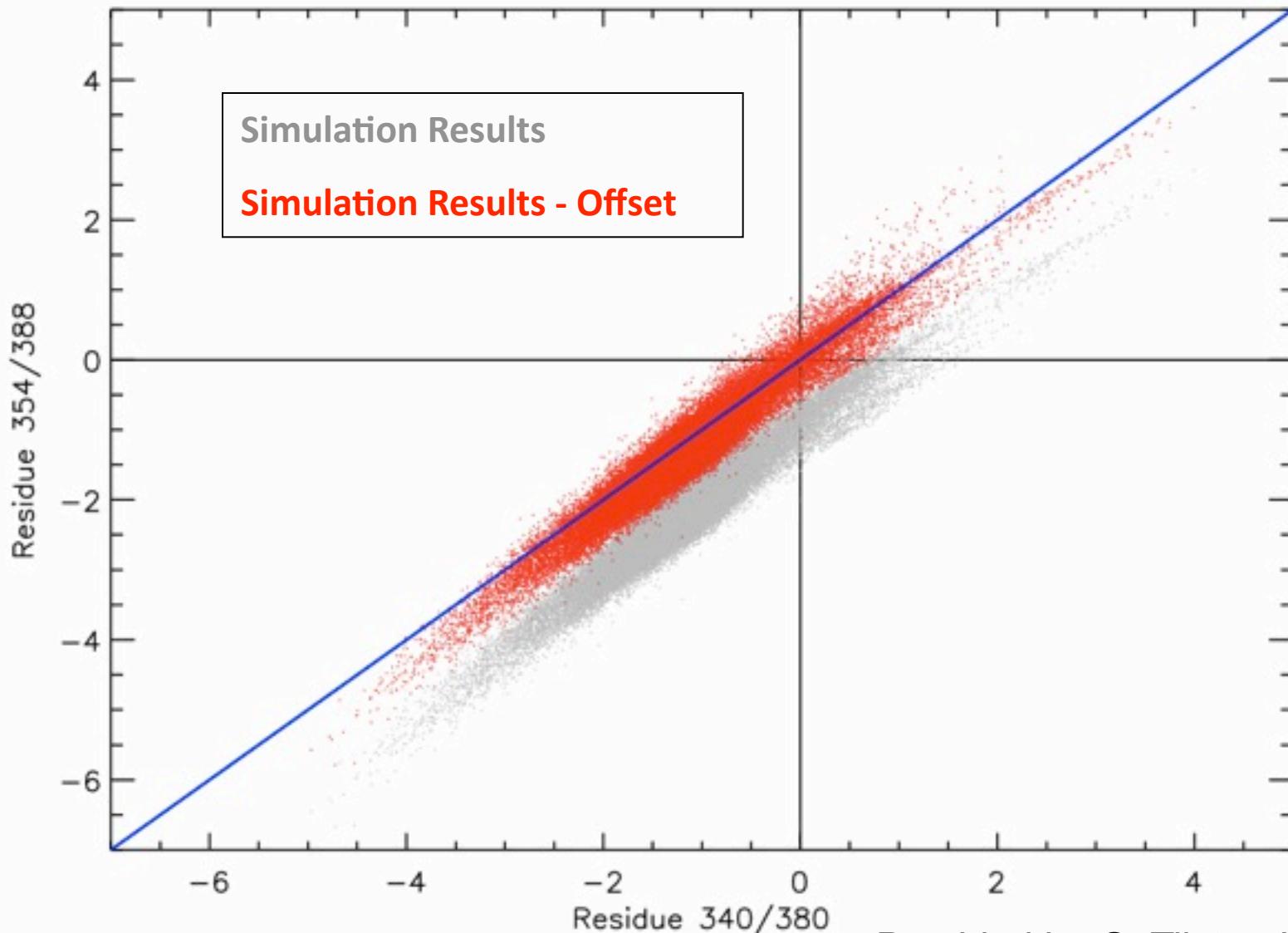
Summary & Conclusions

- Similarities of instruments allows for direct comparisons of AAI
 - Global mean time series have moderate agreement
 - Excellent agreement on a regional scale
- AAI key for trend monitoring and recording variability in seasonal cycling
 - Useful for observing both episodic and persistent aerosol source regions
 - Averaging kernels can provide tool to use the AAI quantitatively.
- Ability to detect aerosol in the presence of clouds, over varying of surface types is ideal for event tracking
 - Differing time of GOME-2 vs. OMI instrument overpass

Australian Bushfires 8-10 Feb 2009: OMI



354/388 nm VS. 340/380 nm



Provided by G. Tilstra, KNMI